

December 20, 2000

Mr. James Chang (SFD-8-1)
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

**Subject: Contract No. 68-W-98-0220 / WA No. 220-11-09WQ
George/Norton Air Force Base Work Assignment
Split Sampling Report, April 2000 Groundwater Sampling Event,
George Air Force Base**

Dear Mr. Chang,

Enclosed is the Split Sampling Report for the April 2000 Groundwater Sampling Event at George Air Force Base. Groundwater samples were collected by Mr. Jim Cureton and Ms. Hilary Waites of TechLaw on April 17 and 18, 2000. The groundwater samples were analyzed by the U.S. EPA Regional Laboratory in Richmond, California and by Liberty Analytical in Cary, North Carolina.

This report is being forwarded to you through electronic mail (via Internet) in WordPerfect® Version 8.0 format. A hard copy of the evaluation will also be submitted with this cover letter. TechLaw understands you will review and augment the evaluation at your discretion.

Thank you for the opportunity to provide U. S. EPA with technical oversight services at George Air Force Base. TechLaw looks forward to working with you in the future. Should you have any questions, please call me at (415) 281-8730, ext. 14.

Sincerely,

Indira Balkissoon

Site Manager

James Cureton, R.G.

Senior Hydrogeologist

copy to: Angela Commisso, U.S. EPA Region IX w/o attachment
 P. Brown-Derocher, TechLaw/Central Files
 Joe Eidelberg, U.S. EPA Region IX

**GEORGE AIR FORCE BASE
Victorville, California**

**Split Sampling Report, April 2000 Groundwater Sampling Event,
George Air Force Base**

Submitted to:

**Mr. James Chang
EPA Work Assignment Manager
U.S. Environmental Protection Agency
Region IX SFD-8-1
75 Hawthorne Street
San Francisco, California 94105**

Submitted by:

**TechLaw Inc.
530 Howard Street
Suite 400
San Francisco, California 94105**

**EPA Work Assignment No.
U.S. EPA Site ID No
Contract No.
EPA WAM
Telephone No.
TechLaw Site Manager
Telephone No.**

**220-11-09WQ
CA2570024453
68-W-98-0220
James Chang
(415) 744-2158
Indira Balkissoon
(415) 281-8730 x 14**

December 20, 2000

**Split Sampling Report, April 2000 Groundwater Sampling Event,
George Air Force Base**

Table of Contents

	page
1.0 Introduction	1
2.0 Scope of Work	1
3.0 Field Work.....	1
3.1 Split Sampling Procedures	2
3.2 Quality Control/Quality Assurance Samples	3
4.0 Analytical Results	3
4.1 Total Petroleum Hydrocarbons	3
4.2 Volatile Organic Compounds	4
4.3 Performance Evaluation Sample	4
4.4 Quality Control	5
4.4.1 Total Petroleum Hydrocarbons	5
4.4.2 Volatile Organic Compounds.....	5
5.0 Conclusions and Recommendations	5

Tables

Table 1	Sample Summary
Table 2	Quality Control Samples
Table 3	Total Petroleum Hydrocarbon Results
Table 4	Volatile Organic Compound Results
Table 5	Volatile Organic Compound Performance Evaluation Results

Attachments

Attachment A	Sample Location Maps
Attachment B	Chain of Custody Forms
Attachment C	Laboratory Reports
Attachment D	Field Log

Attachment E Data Validation Reports

Split Sampling Report, April 2000 Groundwater Sampling Event, George Air Force Base, California

1.0 Introduction

This report contains a summary of TechLaw's split sampling activities performed at George Air Force Base in Victorville, California. U.S. EPA requested that TechLaw conduct groundwater split sampling during the April 2000 groundwater sampling event at George Air Force Base. Sampling was conducted in accordance with TechLaw's "Split Sampling Plan" dated March 30, 2000. The split sampling activities were performed under U.S. EPA Contract No. 68-W-98-220 and U.S. EPA work assignment No. 220-11-Q7LW.

This report presents the scope of work, the split sampling procedures, and the analytical results of groundwater split samples collected during the April 2000 groundwater sampling event.

2.0 Scope of Work

Four monitoring wells were sampled during the split sampling event. Table 1 summarizes the wells sampled and analyses performed. Mr. Jim Cureton and Ms. Hilary Waites, of TechLaw conducted the split sampling activities on April 17 and 18, 2000.

The rationale for sampling each well is summarized below:

WZ-04

Analyses: Total Petroleum Hydrocarbons as gasoline (TPHg), Total Petroleum Hydrocarbons as diesel (TPHd), Volatile Organic Compounds (VOCs)

Rationale: Monitor possible presence of TPHg, TPHd, and VOCs at Site OT-51, evaluate effect of purging method on analytical results.

WZ-06

Analyses: TPHg, TPHd, VOCs

Rationale: Monitor possible presence of TPHg, TPHd, and VOCs at Site OT-51, evaluate effect of purging method on analytical results.

NZ-55

Analyses: VOCs

Rationale: Monitor high concentration of trichloroethene (TCE) in the upper aquifer.

NZ-56

Analyses: VOCs

Rationale: Monitor concentrations of VOCs downgradient of NZ-55.

3.0 Field Work

The TechLaw representatives conducting the field sampling were Mr. Jim Cureton and Ms. Hilary Waites. Mr. Cureton served as the Field Team Leader and Site Safety Officer. Mr. Joe Eidelberg of the U.S. EPA Region 9 Quality Assurance Office was also on site to observe sampling procedures.

George Air Force Base and contractor staff present during the groundwater sampling included:

Harold Reid, George AFB
Calvin Cox, TN & Associates
Gilbert Dimidjian, Montgomery Watson
Bob Mall, M&M Environmental Safety Service
Cole Munsen, M&M Environmental Safety Service

Monitoring wells WZ-04 and WZ-06 were sampled on April 17, 2000. Monitoring wells NZ-55 and NZ-56 were sampled on April 18, 2000.

3.1 Split Sampling Procedures

Mr. Bob Mall and Mr. Cole Munsen of M&M Environmental Safety Service, conducted the purging of each well. Purging of the wells was observed by Mr. Jim Cureton and Ms. Hilary Waites, who were also present for the collection of the split samples.

Each monitoring well was purged using the modified micro-purge technique. Pumping rates were approximately 1 liter/minute. Indicator parameter and groundwater level measurements were collected approximately every five minutes. Groundwater samples were collected by both Montgomery Watson and TechLaw personnel after monitoring parameters had stabilized.

Additional groundwater samples were collected at monitoring wells WZ-04 and WZ-06 to determine whether the purging method has any effect on analytical results of groundwater samples collected at site OT-51. After the collection of the first set of samples, the monitoring wells were purged at approximately 1 liter/minute for five additional minutes. Following the additional purging, Montgomery Watson personnel collected a second set of groundwater samples. TechLaw did not collect split samples of the second set of groundwater samples.

Before the third set of groundwater samples were collected, the purging rate was increased to approximately 5 liters/minute, in an effort to purge each well dry. Monitoring well WZ-06 was successfully purged dry. After well WZ-06 was purged dry the pump was turned off and the water level was allowed to recover. Both Montgomery Watson and TechLaw collected groundwater samples after well WZ-06 had been purged dry. The M&M Environmental Safety Service sampling team was not able to purge monitoring well WZ-04 dry, because the groundwater recovery rate was greater than the flow capacity of the purging pump. The third set of groundwater samples at WZ-04 were collected by Montgomery Watson and TechLaw personnel after approximately two hours of pumping and after approximately 102 gallons of groundwater had been purged.

After the sample containers were filled, the containers were labeled and placed in a cooler. Samples were carefully packaged in bubble wrap and plastic bags, and stored in coolers filled with ice packaged in double sealed plastic bags. Custody seals were affixed to the front and back of each cooler. The samples were sent via overnight delivery on April 18, 2000. The VOC samples were sent to Liberty Analytical in Cary, North Carolina. The TPH samples were sent to the U.S. EPA Regional Laboratory in Richmond, California.

3.2 Quality Control/Quality Assurance Samples

Quality control samples were collected in accordance with the Split Sampling Plan, Basewide Groundwater Monitoring Program April 2000 Event, George Air Force Base. Duplicates were collected at a rate of one per ten samples collected with at least one field duplicate and one equipment blank sample collected for each type of analysis. The equipment blanks were collected following decontamination of the purging pump and hosing. Deionized water was pumped through the purging pump and hosing and collected in sample containers.

Trip blanks were collected at a rate of one for each shipment. Trip blanks consisted of organic-free reagent grade DI water in 40 ML vials and were supplied by Montgomery Watson's laboratory contractor. A matrix spike/matrix spike duplicate (MS/MSD) sample was also collected for each analysis performed. One performance evaluation (PE) sample was submitted to Liberty Analytical for VOC analysis. The PE sample was supplied by IT Corporation Quality Assurance Technical Support (QATS) Laboratory of Las Vegas, Nevada. Finally, a standard supplied by Montgomery Watson representatives was submitted to the U.S. EPA Regional Laboratory in Richmond, California for TPH g and TPHd analysis. Table 2 summarizes the quality control samples collected at each monitoring well.

4.0 Analytical Results

Groundwater samples collected by TechLaw were analyzed by Liberty Analytical (EPA 8260B analyses) or the U.S. EPA Regional Laboratory (TPHg and TPHd analyses) in Richmond, California. The analytical results for the samples collected by the Air Force were supplied to TechLaw, by the Air Force's contractor, Montgomery Watson of Walnut Creek, California. TechLaw did not validate the Air Force's analytical results.

4.1 Total Petroleum Hydrocarbons

Samples from monitoring wells WZ-04 and WZ-06 were analyzed for TPHg and TPHd. The laboratory used a TPHg range of C6 to C10 and a TPHd range of C10 to C28. The carbon ranges were the same as those used by the Air Force's analytical laboratory. The TPH analytical results are presented in Table 3.

Concentrations of TPHg from the micropurge sample at well WZ-04 were 100 $\mu\text{g/l}$. The sample collected after attempting to purge well WZ-04 dry contained TPHg at a concentration of 90 $\mu\text{g/l}$. A duplicate of this sample did not contain concentrations of TPHg above the detection limit. Concentrations of TPHd were not detected in the samples collected from well WZ-04.

Results of the micropurge sample collected from WZ-06 did not show concentrations of TPHg above the estimated reporting limit of 50 $\mu\text{g/l}$. However, TPHg was detected in the sample collected after monitoring well WZ-06 was purged dry at concentrations of 270 $\mu\text{g/l}$. Both the micropurge sample and the sample collected after monitoring well

WZ-06 was purged dry did not contain detectable concentrations of TPHd above the reporting limit of 200 $\mu\text{g/l}$.

4.2 Volatile Organic Compounds

Samples from monitoring wells WZ-04, WZ-06, NZ-55, and NZ-56 were analyzed for VOCs by SW-846 Method 8260B. Table 4 presents VOC analytical results.

Neither sample collected from well WZ-04 contained VOCs above the reporting limit, with the exception of methylene chloride. Methylene chloride was detected in both samples from WZ-04 at an estimated concentration of 0.3 $\mu\text{g/l}$.

Both samples collected from WZ-06 contained detections of methylene chloride, benzene, toluene, ethylbenzene and total xylenes at relatively low concentrations. The sample collected after the well was purged dry generally contained higher contaminant concentrations than the micropurge sample. The highest detections in the sample collected after purging the well dry were toluene (38 $\mu\text{g/l}$) and total xylenes (47 $\mu\text{g/l}$). However, both detections were flagged by the analytical laboratory as exceeding the calibration range of the laboratory instrument and the reported values should be considered estimates (possibly biased low).

A sample and duplicate sample were collected from well NZ-55 and analyzed for VOCs. Both the sample and the duplicate contained elevated concentrations of TCE and cis-1,2-dichloroethene (cis-1,2-DCE). Detections of TCE and cis-1,2-DCE in the primary sample were 390 and 65 $\mu\text{g/l}$, respectively. However, both concentrations were flagged by the analytical laboratory as exceeding the calibration range of the laboratory instrument and the reported values should be considered estimates (possibly biased low). The duplicate sample contained concentrations of TCE and cis-1,2-DCE at 1000 and 64 (estimated) $\mu\text{g/l}$. The primary sample from NZ-55 also contained low concentrations of chloroform, 1,1-DCE, methylene chloride, trans-1,2-dichloroethene (trans-1,2-DCE), carbon tetrachloride, benzene, and 1,2-dichloroethane (1,2-DCA).

TCE (at a concentration of 4 $\mu\text{g/l}$) was the only compound detected in the sample collected from well NZ-56.

4.3 Performance Evaluation Sample

A PE sample was obtained from the IT Corporation Quality Assurance Technical Support (QATS) Laboratory under contract to the U.S. EPA. The PE sample was for low to medium levels of volatile organic compounds. The sample was prepared in the field by Mr. Jim Cureton and Ms. Hilary Waites, of TechLaw, according to the procedure described in the Split Sampling Plan for the April 2000 Sampling Event dated March 30, 2000. A minor modification was made to the procedure for PE sample preparation. This modification consisted of using deionized (DI) water instead of methanol during the first rinse of the syringe. PE sample results are presented in Table 5. PE scoring results were not available, therefore it is not possible to evaluate the quality of the analytical data based on the PE sample results.

4.4 Quality Control

Data validation was performed on the TPH analyses conducted by the U.S. EPA Regional Laboratory in Richmond, California. Data validation reports are presented in Appendix E. The data was validated according to the U.S. EPA Contract Laboratory program Functional Guidelines for Organic Data Review and SW-846 Method 8015B. A quality control (QC) review of the Liberty Analytical data summary reports was performed.

4.4.1 Total Petroleum Hydrocarbons

The TPH detection limits for the U.S. EPA split samples were generally lower than those reported by George AFB. In validating the TPHd results, all QC criteria were met and data qualifiers were not applied. The TPHg results are acceptable as qualified. Qualifiers were issued due to exceeded hold time (one day). Aside from hold time, all TPHg QC criteria appear acceptable.

4.4.2 Volatile Organic Compounds

The VOC results from TechLaw and George AFB appear generally comparable. However, the TechLaw reporting limits for the NZ-55 field duplicate (YAK95) are elevated when compared to the reporting limits of the primary sample collected at NZ-55 (YAK94). This is due to sample dilution which was required by calibration exceedences for TCE and cis-1,2-DCE.

The TCE result from the field duplicate sample collected at NZ-55 is more indicative of actual concentrations at well NZ-55. The reason for this is that the concentration of

TCE exceeded the calibration range of the laboratory instrument in the primary sample collected at NZ-55 and thus this result is of questionable validity.

5.0 Conclusions and Recommendations

Based on the April 2000 analytical results, there appears to be reasonable agreement between the Air Force's results and U.S. EPA's results.

Results from monitoring well WZ-04 are consistent with results from the previous two sampling events. The similarity between analytical results from both the micropurge sample and the sample collected after attempting to purge the well dry, indicates that the micropurge sampling technique is appropriate for this well.

Monitoring well WZ-06 was sampled after micropurging and then resampled after the well had been purged dry. Results from the sample collected after the well was purged dry were consistently higher than the micropurge sample. This indicates that the micropurge method is not obtaining representative groundwater samples from well WZ-06. It is possible that "stagnant" groundwater is being purged and sampled from WZ-06, probably due to low recharge rates. It is recommended that sampling procedures for monitoring well WZ-06 be changed, so that micropurging is no longer used at this well. Instead well WZ-06 should be purged dry and sampled when enough groundwater has reentered the well to collect a sample.

Results from the duplicate sample at upper aquifer monitoring well NZ-55 indicate that April 2000 TCE concentrations ($1,000 \mu\text{g/l}$) significantly increased in comparison to November 1999 TCE concentrations ($530 \mu\text{g/l}$). Also, TCE concentrations in well NZ-55 were as low as $2.2 \mu\text{g/l}$ (estimated) in October 1997. Capture of contaminated groundwater near NZ-55 is not being achieved at this time as there are no extraction wells located near the well. Based on these results, expansion of the current extraction system is warranted to improve mass removal and hydraulic capture of the TCE plume in the upper aquifer near NZ-55.

Results at monitoring well NZ-56 confirm that TCE is at concentrations just below the MCL. However, TCE concentrations appear to be increasing in this well also. TCE concentrations at NZ-56 have been non-detect or below $1 \mu\text{g/l}$ since September 1994. Well NZ-56 is located downgradient of well NZ-55. Also, wells NZ-55 and NZ-56 have similar screened intervals. Therefore, it is likely that the TCE plume in the upper aquifer

is migrating towards well NZ-56. Monitoring of well NZ-56 for TCE should continue to be conducted on a semi-annual basis.

Tables

Table 1

**Sample Summary
Split Sampling Event, April, 2000
George Air Force Base**

Operable Unit	Monitoring Well	Date Sampled	TechLaw/EPA Analyses	GAFB Analyses
	WZ-04 (micropurge)	4/17/00	CLP VOCs EPA 8015M TPHg EPA 8015M TPHd	EPA 8260B EPA 8015M TPHg EPA 8015M TPHd
	WZ-04 (attempt to purge well dry, then sample)	4/17/00	CLP VOCs EPA 8015M TPHg EPA 8015M TPHd	EPA 8260B EPA 8015M TPHg EPA 8015M TPHd
	WZ-06 (micropurge)	4/17/00	CLP VOCs EPA 8015M TPHg EPA 8015M TPHd	EPA 8260B EPA 8015M TPHg EPA 8015M TPHd
	WZ-06 (purge well dry then sample)	4/17/00	CLP VOCs EPA 8015M TPHg EPA 8015M TPHd	EPA 8260B EPA 8015M TPHg EPA 8015M TPHd
	NZ-55	4/18/00	CLP VOCs	EPA 8260B
	NZ-56	4/18/00	CLP VOCs	EPA 8260B

Table 2

Quality Control Samples
Split Sampling Event, April, 2000
George Air Force Base

Location	Sample Type	Analysis	
NZ-55	MS/MSD	CLP VOCs	
	Field Duplicate	CLP VOCs	
	Equipment Blank	CLP VOCs	
	Trip Blank	CLP VOCs	
Not applicable	Performance Evaluation	CLP VOCs	
WZ-04 (attempt to purge well dry, then sample)	MS/MSD	EPA 8015M	TPHg
		EPA 8015M	TPHd
	Field Duplicate	EPA 8015M	TPHg
		EPA 8015M	TPHd
	Equipment Blank	EPA 8015M	TPHg
		EPA 8015M	TPHd
	Trip Blank	EPA 8015M	TPHg

Table 3
Total Petroleum Hydrocarbon Results
Split Sampling Event, April, 2000
George Air Force Base

TechLaw Sample Numbers	TL00-A0001-Q7 / TL00-B0001-Q7		TL00-A0002-Q7 / TL00-B0002-Q7		TL00-A0003-Q7 / TL00-B0003-Q7		TL00-A0004-Q7 / TL00-B0004-Q7	
Sampling Location	WZ-04 (micropurge)		WZ-04 (attempt to purge well dry, then sample)		WZ-04 Duplicate of (attempt to purge well dry, then sample)		Equipment Blank	
Matrix	groundwater		groundwater		groundwater		DI Water	
TPH	ug/l		ug/l		ug/l		ug/l	
	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB
Gasoline Range Organics ¹	100	50 U	90 J	34 F	50 UJ	NA	50 UJ	9.6 F
Diesel Range Organics ²	200 U	500 U	200 U	500 U	200 U	NA	200 U	500 U

TechLaw Sample Numbers	TL00-A0005-Q7		TL00-A0006-Q7 / TL00-B0005-Q7		TL00-A0007-Q7 / TL00-B0006-Q7	
Sampling Location	Trip Blank		WZ-06 (micropurge)		WZ-06 (purge well dry, then sample)	
PUPMatrix	groundwater		groundwater		groundwater	
TPH	ug/l		ug/l		ug/l	
	TL	GAFB	TL	GAFB	TL	GAFB
Gasoline Range Organics ¹	50 UJ	21 F	50 UJ	30 F	270	520

Diesel Range Organics ²	NA	NA	200 U	500 U	200 U	500 U
------------------------------------	----	----	-------	-------	-------	-------

NA = Not Analyzed

U = Not detected at the reported level

J = The analyte was positively identified, the quantitation is an estimation.

E = Concentration exceeded the calibration range and the reported value should be considered an estimate

F = The analyte was positively identified, but the associated numerical value is below the reporting limit.

TechLaw Sample Number	YAK90		YAK91		YAK92		YAK93		YAK94		YAK95		YAK96		YAK97		YAK99	
Sampling Location	WZ-04 (micropurge)		WZ-04 (attempt to purge well dry)		WZ-06 (micropurge)		WZ-06 (purge well dry)		NZ-55		NZ-55 Field Duplicate		NZ-55 Equip. Blk.		NZ-55 Trip Blank		NZ-56	
Matrix	groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater	
Volatile Organic Compounds	ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB
Chloromethane	1 U	1.3 U	1 U	1.3 U	1 U	1.3 U	1 U	1.3 U	1 U	1.3 U	71 U	NA	1 U	1.3 U	1 U	1.3 U	1 U	1.3 U
Vinyl Chloride	0.5 U	1.1 U	0.5 U	1.1 U	0.5 U	1.1 U	0.5 U	1.1 U	0.5 U	1.1 U	36 U	NA	0.5 U	1.1 U	0.5 U	1.1 U	0.5 U	1.1 U
Bromomethane	1 U	1.1 U	1 U	1.1 U	1 U	1.1 U	1 U	1.1 U	1 U	1.1 U	71 U	NA	1 U	1.1 U	1 U	1.1 U	1 U	1.1 U
1,1-Dichloroethene	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	0.3 JB	1.2 U	71 U	NA	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U
Acetone	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	710 U	NA	10 U	NA	10 U	NA	10 U	NA
Methylene Chloride	0.3 JB	3 U	0.3 JB	3 U	0.5 JB	3 U	0.3 JB	0.86	0.3 JB	0.67 F	71 U	NA	0.3 JB	3 U	0.5 JB	1.2	1 U	3 U
trans-1,2-Dichloroethene	1 U	0.6 U	1 U	0.6 U	1 U	0.6 U	1 U	0.6 U	0.3 J	0.6 U	71 U	NA	1 U	0.6 U	1 U	0.6 U	1 U	0.6 U
Methyl tert-Butyl Ether	1 U	5 U	1 U	5 U	1 U	5 U	1 U	5 U	1 U	5 U	71 U	NA	1 U	5 U	1 U	5 U	1 U	5 U
cis-1,2-Dichloroethene	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	65 E	65.5	64 J	NA	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U
2-Butanone	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	710 U	NA	10 U	NA	7J	NA	10 U	NA
Chloroform	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	2	1.8	71 U	NA	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U
1,1,1-Trichloroethane	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U	71 U	NA	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U
Carbon Tetrachloride	0.5 U	2.1 U	0.5 U	2.1 U	0.5 U	2.1 U	0.5 U	2.1 U	0.3 J	2.1 U	36 U	NA	0.5 U	2.1 U	0.5 U	2.1 U	0.5 U	2.1 U
Benzene	1 U	0.4 U	1 U	0.4 U	1	0.4 U	12	18.8	0.3 J	0.4 U	71 U	NA	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U
1,2-Dichloroethane	0.5 U	0.6 U	0.5 U	0.6 U	0.5 U	0.6 U	0.5 U	0.6 U	0.4 J	0.6 U	36 U	NA	0.5 U	0.6 U	0.5 U	0.6 U	0.5 U	0.6 U

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

TechLaw Sample Number	YAK90		YAK91		YAK92		YAK93		YAK94		YAK95		YAK96		YAK97		YAK99	
Sampling Location	WZ-04 (micropurge)		WZ-04 (attempt to purge well dry)		WZ-06 (micropurge)		WZ-06 (purge well dry)		NZ-55		NZ-55 Field Duplicate		NZ-55 Equip. Blk.		NZ-55 Trip Blank		NZ-56	
Matrix	groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater	
Volatile Organic Compounds	ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	390 E	1280B	1000	NA	0.7 J	1.1	1 U	1 U	4	4.7 B
1,2-Dichloropropane	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U	71 U	NA	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U
Bromodichloromethane	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U	71 U	NA	1 U	0.8 U	1 U	0.8 U	1 U	0.8 U
cis-1,3-Dichloropropene	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	36U	NA	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U
Toluene	1 U	1.1 U	1 U	1.1 U	3	1.5	38E	60.5	1 U	1.1 U	71 U	NA	1 U	1.1 U	1 U	1.1 U	1 U	1.1 U
trans-1,3-Dichloropropene	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	36 U	NA	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3	3.2	71 U	NA	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1.4 U	1 U	1.4 U	1 U	1.4 U	1 U	1.4 U	1 U	1.4 U	71 U	NA	1 U	1.4 U	1 U	1.4 U	1 U	1.4 U
2-Hexanone	10 U	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA	710 U	NA	10 U	NA	2 J	NA	10 U	NA
Dibromochloromethane	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	71 U	NA	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U
Dichlorodifluoromethane	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	1 U	NA	NA	NA	1 U	NA	1 U	NA	0.55
Ethylbenzene	1 U	0.6 U	1 U	0.6 U	0.4 J	0.6 U	7	12.2 J	1 U	0.6 U	71 U	NA	1 U	0.6 U	1 U	0.6 U	1 U	0.6 U
Xylenes (total)	1 U	NA	1 U	NA	3	NA	47E	NA	1 U	NA	71 U	NA	1 U	NA	1 U	NA	1 U	NA
o-Xylene	NA	1.1 U	NA	1.1 U	NA	0.69	NA	28.4	NA	1.1 U	NA	NA	NA	1.1 U	NA	1.1 U	NA	1.1 U
m&p-Xylene	NA	1.3 U	NA	1.3 U	NA	0.99	NA	47.1	NA	1.3 U	NA	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U
p-Isopropylbenzene	NA	0.4 U	NA	0.4 U	NA	0.4 U	NA	1.5	NA	NA	NA	NA	NA	0.4 U	NA	0.4 U	NA	0.4 U

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

TechLaw Sample Number	YAK90		YAK91		YAK92		YAK93		YAK94		YAK95		YAK96		YAK97		YAK99	
Sampling Location	WZ-04 (micropurge)		WZ-04 (attempt to purge well dry)		WZ-06 (micropurge)		WZ-06 (purge well dry)		NZ-55		NZ-55 Field Duplicate		NZ-55 Equip. Blk.		NZ-55 Trip Blank		NZ-56	
Matrix	groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater		groundwater	
Volatile Organic Compounds	ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l		ug/l	
	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB	TL	GAFB
Styrene	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U	71 U	NA	1 U	0.4 U	1 U	0.4 U	1 U	0.4 U
sec-Butylbenzene	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	0.56	NA	1.3 U	NA	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U
Bromoform	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	71 U	NA	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U
Isopropylbenzene	NA	0.5 U	NA	0.5 U	NA	0.5 U	2 NJ	2.1	NA	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,2,4-Trimethylbenzene	NA	1.3 U	NA	1.3 U	NA	1.3 U	NA	1.9	NA	1.3 U	NA	NA	NA	1.3 U	NA	1.3 U	NA	1.3 U
1,3,5-Trimethylbenzene	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	4.6	NA	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U
1,3-Dichlorobenzene	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U	71 U	NA	1 U	1.2 U	1 U	1.2 U	1 U	1.2 U
1,4-Dichlorobenzene	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	71 U	NA	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U
1,2-Dichlorobenzene	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	1 U	0.3 U	71 U	NA	1 U	1 U	1 U	1 U	1 U	1 U

NA = Not Analyzed

U = Not detected at the reported level

J = The analyte was positively identified, the quantitation is an estimate

B = The analyte was present in an associated blank

JB = The analyte was present in an associated blank, the quantitation is an estimate

F = The analyte was positively identified, but the associated numerical value is below the reporting limit

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

TechLaw Sample Number	YAK98		
Sampling Location	PE Sample		
Matrix	Water		
Volatile Organic Compounds	ug/l		
	Reported	True Value	Acceptable Limits
Chloromethane	1	NA	NA
Vinyl Chloride	0.6	NA	NA
Bromomethane	0.6 J	NA	NA
1,1-Dichloroethene	0.7 J	NA	NA
Acetone	3 J	NA	NA
Methylene Chloride	0.8 JB	NA	NA
2-Butanone	3 J	NA	NA
Chloroform	0.7 J	NA	NA
1,1,1-Trichloroethane	0.8 J	NA	NA
Carbon Tetrachloride	0.7	NA	NA
Benzene	0.8 J	NA	NA
1,2-Dichloroethane	0.8	NA	NA
Trichloroethene	0.8 J	NA	NA
1,2-Dichloropropane	0.8 J	NA	NA
Bromodichloromethane	0.7 J	NA	NA
cis-1,3-Dichloropropene	0.8	NA	NA
Toluene	1	NA	NA
trans-1,3-Dichloropropene	0.5	NA	NA

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

TechLaw Sample Number	YAK98		
Sampling Location	PE Sample		
Matrix	Water		
Volatile Organic Compounds	ug/l		
	Reported	True Value	Acceptable Limits
1,1,2-Trichloroethane	0.8 J	NA	NA
Tetrachloroethene	0.7 J	NA	NA
Dibromochloromethane	0.8 J	NA	NA
Ethylbenzene	0.9 J	NA	NA
Xylenes (total)	1	NA	NA
Styrene	0.4 J	NA	NA
Bromoform	0.8 J	NA	NA
1,3-Dichlorobenzene	0.9 J	NA	NA
1,4-Dichlorobenzene	0.8 J	NA	NA
1,2-Dichlorobenzene	1	NA	NA

1. Only analytes actually present in the PE sample are listed in this table. All other analytes reported as non-detected by the laboratory.

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Attachment A
Sample Location Maps

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Attachment B
Chain of Custody Forms

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Attachment C
Laboratory Reports

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Attachment D

Field Log

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Attachment E
Data Validation Reports

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

DATA VALIDATION REPORT

Report Date: May 10, 2000
 SDG No.: 00110A
 Site: George AFB
 Matrix: 6-waters
 Laboratory: Lockheed Martin - Environmental Services Assistance Teams, Region 9
 Collection Date: 4/17/00

This report provides the data validation review for the six groundwater samples collected on April 17, 2000 from George AFB, the samples, which are listed below, were analyzed for TPH-Diesel Range Organics on April 26, 2000.

PARAMETER	SAMPLE NUMBER
TPH-DRO	TL00-B0001-Q7; TL00-B0002-Q7; TL00-B0003-Q7; TL-B0004-Q7; TL-B0005-Q7; TL-B0006-Q7

Data validation was conducted in accordance with the documents "Test Methods for Evaluating Solid Wastes, SW-846, Final Update III, " (June, 1997) and USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, October, 1999 (Functional Guidelines).

- *● data completeness
- *● holding times
- *● calibrations
- *● laboratory and field blank analyses
- *● surrogate recoveries
- *● laboratory control sample (LCS) analyses
- *● matrix spike sample analysis
- *● field duplicate samples
- *● sample result verification
- * All criteria met for this parameter

Data Completeness

This data package was complete and legible. All data was usable as reported.

Holding Times

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. Holding times were met for all analytes in this data package.

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Calibrations

The initial and continuing calibration standards met all QC requirements.

Laboratory and Field Blank Analyses

There were no detects in the method blanks.

Surrogate Recoveries

All surrogate recoveries were within QC criteria.

Laboratory Control Sample (LCS) Analyses

All laboratory control sample recoveries were within the control limits of 70-130%.

Duplicate Analyses

All matrix spike duplicate criteria were met.

Matrix Spike Sample Analyses

All matrix spike criteria were met.

Field Duplicate Samples

Sample TL00-B0003-Q7 is the field duplicate sample of TL00-B0002-Q7. Both samples were non-detected at 200 ug/l.

Sample Result Verification

Sample results were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors. The reported quantitations were found to be acceptable.

Sample TL00-B0005-Q7 was reported at 100 ug/l which is below the quantitation limit of 200 ug/l. Therefore, results for this sample were changed to the quantitation limit of 200 ug/l and qualified "U".

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Summary of Analytical Results - George AFB
Total Petroleum Hydrocarbons - Diesel Range Organics

TechLaw Sample Number	TL00-B0001-Q7		TL00-B0002-Q7		TL00-B0003-Q7		TL00-B0004-Q7	
Sampling Location	WZ-04 (micropurge)		WZ-04 (purge well dry; recover)		Field Duplicate of TL00-B0002-Q7		Equipment Blank	
Matrix	groundwater		groundwater		groundwater		DI Water	
TPH	ug/l		ug/l		ug/l		ug/l	
	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Diesel Range Organics	200	U	200	U	200	U	200	U

TechLaw Sample Number	TL00-B0005-Q7		TL00-B0006-Q7	
Sampling Location	WZ-06 (micropurge)		WZ-06 (purge well dry, recover)	
Matrix	groundwater		groundwater	
TPH	ug/l		ug/l	

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

	Result	Qualifier	Result	Qualifier
Diesel Range Organics	200	U	200	U

U = Undetected at the reported value.

J = Estimated value, result is less than the quantitation limit.

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

DATA VALIDATION REPORT

Report Date: May 10, 2000
SDG No.: 00110A
Site: George AFB
Matrix: 7-waters
Laboratory: Lockheed Martin - Environmental Services Assistance Teams, Region 9
Collection Date: 4/17/00

This report provides the data validation review for the seven groundwater samples collected on April 17, 2000 from George AFB, the samples, which are listed below, were analyzed for TPH-Gasoline Range Organics on May 1 and May 2, 2000.

PARAMETER	SAMPLE NUMBER
TPH-GRO	TL00-A0001-Q7; TL00-A0002-Q7; TL00-A0003-Q7; TL-A0004-Q7; TL-A0005-Q7; TL-A0006-Q7; TL00-A0007-Q7

Data validation was conducted in accordance with the documents "Test Methods for Evaluating Solid Wastes, SW-846, Final Update III, " (June, 1997) and USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, October, 1999 (Functional Guidelines).

- *● data completeness
- holding times
- *● calibrations
- *● laboratory and field blank analyses
- *● surrogate recoveries
- *● laboratory control sample (LCS) analyses
- *● matrix spike sample analysis
- field duplicate samples
- *● sample result verification
- * All criteria met for this parameter

Data Completeness

This data package was complete and legible. All data was usable as reported.

Holding Times

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding times for five samples (TL00-A0002-Q7, TL00-A0003-Q7, TL00-A0004-Q7, TL00-A0005-Q7, TL00-A0006-Q7) were exceeded by one day. The results for these samples were qualified as estimated and flagged "J, UJ".

Calibrations

The initial and continuing calibration standards met all QC requirements.

Laboratory and Field Blank Analyses

There were no detects in the method blanks.

TPH-gasoline range organics were detected in the trip blank, sample TL00-A0005-Q7. However, the results were detected below the quantitation limit. Sample TL00-A0006-Q7 was also detected below the quantitation limit. Values for both samples were changed to the quantitation limit of 50 ug/l and flagged as non-detect "U".

Surrogate Recoveries

The surrogate recovery for sample TL00-A0001-Q7 was slightly outside the QC limits of 70 to 130 percent at 130.998%. Since this value was only slightly outside the QC limit, no action was taken.

All remaining surrogate recoveries were within QC criteria.

Laboratory Control Sample (LCS) Analyses

All laboratory control sample recoveries were within the control limits of 65-135%.

Duplicate Analyses

All matrix spike duplicate criteria were met.

Matrix Spike Sample Analyses

All matrix spike criteria were met.

Field Duplicate Samples

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Sample TL00-A0003-Q7 is the field duplicate sample of TL00-A0002-Q7. The result for TL00-A0002-Q7 was 90 ug/l, however the result for TL00-A0003-Q7 was undetected at 50 ug/l. No qualifiers were issued since both samples were within +/- the detection limit, and one sample was reported as non-detected.

Sample Result Verification

Sample results were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors. The reported quantitations were found to be acceptable.

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Summary of Analytical Results - George AFB
Total Petroleum Hydrocarbons - Gasoline Range Organics

TechLaw Sample Number	TL00-A0001-Q7		TL00-A0002-Q7		TL00-A0003-Q7		TL00-A0004-Q7	
Sampling Location	WZ-04 (micropurge)		WZ-04 (purge well dry; recover)		Field Duplicate of TL00-A0002-Q7		Equipment Blank	
Matrix	groundwater		groundwater		groundwater		DI Water	
TPH	ug/l		ug/l		ug/l		ug/l	
	Result	Qualifier	Result	Qualifier	Result	Qualifier	Result	Qualifier
Gasoline Range Organics	100		90	J	50	UJ	50	UJ

TechLaw Sample Number	TL00-A0005-Q7		TL00-A0006-Q7		TL00-A0007-Q7	
Sampling Location	Trip Blank		WZ-06 (micropurge)		WZ-06 (purge well dry, recover)	
Matrix	DI Water		groundwater		groundwater	
TPH	ug/l		ug/l		ug/l	
	Result	Qualifier	Result	Qualifier	Result	Qualifier

Table 4
Volatile Organic Compound Results
Split Sampling Event, April, 2000
George Air Force Base

Gasoline Range Organics	50	UJ	50	UJ	270	
-------------------------	----	----	----	----	-----	--

J = Result estimated.

UJ = Undetected at the reported estimated detection limit.